The claims are reprinted herein for the examiner's convenience,

1. (previously presented) An apparatus for directing a radiation beam comprising:

a movable member supported for movement by a fixed member such that a coefficient of friction exists between the movable member and the fixed member, said movable member including an optical element fixedly attached thereto;

a magnetic element fixedly attached to the movable member;

a magnetically permeable stator element that is stationary with respect to the movable member, said stator element and said magnetic element mutually generating a magnetic traction force there between;

a current coil wound around at least a portion of the stator element; and

a current driver for providing a current in the current coil thereby inducing an electromagnetic force in the stator element, said electromagnetic force acting on the magnetic element for controlling movement of the optical element; wherein

said magnetic traction force in combination with the coefficient of friction provides a clamping force for holding the movable element in a stationary orientation when no current is passing through the current coil.

2. (previously presented) The apparatus of claim 1 wherein:

the fixed member includes an inner bearing seat for receiving the outer beating surface therein such that the coefficient of friction exists between the outer beating surface and the inner bearing seat.

3. (original) An apparatus according to claim 1 further comprising; sensor means for tracking an actual orientation of the optical element.

4. (original) An apparatus according to claim 3 wherein the sensor means produces a sensor signal representative of an actual orientation of the optical element.

5. (previously presented) An apparatus according to claim 4 further including a servo current driver comprising:

a first input terminal for receiving the sensor signal from the sensor means;

a second input terminal for receiving an input signal representing a desired orientation of the optical element;

a processing circuit for comparing the sensor signal with the input signal and, a current source for delivering a current to the current coil for moving the optical element to the desired orientation.

6. (original) The apparatus of claim 2 wherein the outer bearing surface comprises a substantially spherical surface and wherein the bearing seat comprises a substantially spherical bearing raceway and wherein the spherical bearing surface and the spherical bearing raceway have a substantially coincident spherical radius.

7. (original) An apparatus according to claim 6 wherein the stator element is configured to provide mutually perpendicular electromagnetic forces in response to drive currents in the current coil, said mutually perpendicular electromagnetic forces providing mutually perpendicular

rotations of the movable member for orienting the optical element.

8. (previously presented) An apparatus according to claim 1, wherein

said movable member includes a substantially spherical element having said optical element attached to a first side thereof and a spherical outer bearing surface formed on a second side opposed to the first side;

said fixed member includes a thin flat plate having a substantially spherical bearing seat formed thereon for receiving the spherical outer bearing surface for rotation therein, the first and the second side of the movable member being accessible while the movable member is supported in the bearing seat; said apparatus further including

a cruciform shaped stator element attached to the fixed member and spherically formed to provide a substantially uniform air gap surrounding the accessible second side of the movable member, the stator element further comprising four stator arms connected together by a center portion for providing a magnetic flux path between adjacent stator arms, the four stator arms comprising first and third opposing stator arms having a substantially coincident first longitudinal axis and second and fourth opposing stator arms having a substantially coincident second longitudinal axis said first and second longitudinal axes being substantially perpendicular;

a magnetic element attached to the second side of the movable member in the air gap between the movable member and the stator, said magnetic element comprising four magnet ring portions each having a north magnetic pole and a south magnetic pole, the four magnetic portions including opposing first and third portions corresponding with the first and third stator arms and opposing second and fourth portions corresponding with the second and fourth stator

arms and each of the magnetic portions is oriented with the north and south magnetic poles oppositely facing on adjacent sections; and,

a current coil wound around each of the four stator arms to provide opposing first and third current coils and opposing second and fourth current coils.

9. (original) The apparatus of claim 8 wherein opposing first and third current coils are connected in one of a parallel and a serial current circuit and driven by a first current driver and wherein second and fourth opposing current coils are connected in one of a parallel and a serial current circuit and driven by a second current driver.

10. (original) The apparatus of claim 2 wherein the outer bearing surface comprises a substantially cylindrical surface and wherein the bearing seat comprises a substantially cylindrical bearing raceway and wherein the cylindrical bearing surface and the cylindrical bearing raceway have a substantially coincident cylindrical radius.

11. (original) The apparatus according to claim 1 further comprising a lens element in the path of the radiation beam for focusing the radiation beam at a desired focal position.

12. (original) The apparatus according to claim 1 further comprising an electronic controller for modulating one of amplitude and wavelength of the radiation source.

13. (previously presented) (previously presented) An apparatus for orienting a surface comprising:

a movable member having a first side and an opposing second side, said first side including the surface to be oriented and said second side comprising an outer bearing surface;

a fixed member having an inner bearing seat for receiving the outer bearing surface therein such that a coefficient of friction exists between the outer bearing surface and the inner bearing seat;

a magnetic element attached to and movable with the movable member,

a magnetically permeable stator element that is stationary with respect to the movable member, said stator element and said magnetic element mutually generating a magnetic traction force there between, said magnetic traction force in combination with the coefficient of friction providing a clamping force for holding the movable member in a stationary orientation;

a current coil wound around a portion of the stator element; and,

a current driver for providing a current in the current coil thereby inducing an electromagnetic force in the stator element, said electromagnetic force acting on the magnetic element for overcoming the clamping force and moving the movable member in a controller manner.

14. (original) The apparatus of claim 13 further comprising a radiation source attached to the first side of the movable member, said radiation source emitting a radiation beam that is directed in a desired direction by moving the movable member in a controlled manner.

15. (original) The apparatus of claim 13 further comprising a radiation detector attached to the first side of the movable member, said radiation detector providing a signal in response to receiving a radiation beam thereon and wherein the radiation detector may be oriented in a

desired receiving direction by moving the movable member in a controlled manner.

16. (previously presented) The apparatus of claim 13 further comprising:

a radiation source coupled to an input end of an optical conduit for directing a radiation beam through the optical conduit;

an output end of the optical conduit for delivering the radiation beam therefrom; and,

wherein the output end is attached to and movable with the movable element for directing the radiation beam in a desired direction.

17. (previously presented) The apparatus of claim 16 further comprising:

a telefocal lens having an input focal plane and an output focal plane said telefocal lens being positioned with the input focal plane substantially coincident with an axis of rotation of the movable member, and,

wherein the radiation beam is incident on the output focal plane at a substantially perpendicular incidence angle with respect thereto for each pointing direction of the radiation beam.

18. (previously presented) An adjustable beam deflector comprising:

a beam deflecting movable element that may be received by a fixed element such that said beam deflecting movable element may be moved with respect to said fixed element over a plurality of beam deflecting positions by overcoming an inertial force, said inertial force being substantially the same at each of the plurality of beam deflecting positions, and

positioning means for moving said beam deflecting movable element with respect to said

fixed element when activated by applying a movement force to said beam deflecting movable element that is greater than said inertial force, and for permitting said beam deflecting moveable element to remain in a fixed position with respect to said fixed element when not activated due to the presence of said inertial force.

19. (previously presented) An adjustable beam deflector as claimed in claim 18, wherein said inertial force is provided by an attractive force between a permanent magnet and a magnetically permeable material.

20. (previously presented) An adjustable beam deflector as claimed in claim 19, wherein said beam deflecting movable element includes the permanent magnet, and said fixed element includes the magnetically permeable material, the permanent magnet being spaced from the magnetically permeable material by a distance that is substantially the same at each of said plurality of positions in said range of beam deflector positions of said movable element.

21. (previously presented) An adjustable beam deflector as claimed in claim 20, wherein said magnetically permeable material includes a plurality of arms and said positioning means includes stator coils that are wrapped around said arms.

22. (previously presented) An adjustable beam deflector as claimed in claim 18, wherein said inertial force is provided by a frictional force at an interface between said beam deflecting movable element and said fixed element.

23. (previously presented) An adjustable beam deflector as claimed in claim 22, wherein the frictional force is provided at a bearing interface.

24. (previously presented) An adjustable beam deflector as claimed in claim 18, wherein said inertial force is greater than a gravitational force on said beam deflecting movable element.